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SWERNOFSKY LAW GROUP PC P.O. BOX 390013 MOUNTAIN VIEW, CA 94039-0013			LE, UYEN T	
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			2163	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/854,187

Applicant(s)

KLEIMAN ET AL.

Examiner

Uyen T. Le

Art Unit

2163

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 54,56-98,104,105,111-114,121-124,126-131 and 133-147 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 54,56-98,104,105,111-114,121-124,126-131 and 133-147 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Page 2 has a typographical error. Applicant indicated that claims 1 and 53 are canceled. It is assumed that applicant meant claims 52 and 53.
2. Applicant amended claims 54, 104, 121, 131, 141 by further describing a file system. Clearly any file system stores and retrieves information. However, those claims do not require any information retrieval or storage operation using a file system. The body of the claims consists of mere non-functional descriptive material without any practical application. Claim 54 for example recites data stored in blocks associated with a plurality of bits, at least one bit identifying an earlier version of the file system, at least a second bit also identifying an earlier version of the file system. Although the claim implicitly recites data embodied on a computer-readable medium since bits are digital, the data does not impart functionality to either the data as claimed or to the computer. As such, the claimed invention recites non-functional descriptive material, i.e., mere data. Non-functional descriptive data stored on a computer-readable medium is merely carried on the medium, it is not structurally and functionally interrelated to the medium. Therefore, the claimed subject matter is non-statutory.
3. Applicant's amendment to claim 62 renders claims 62-81 non-statutory. The claims now recite mere arrangement of non-functional data that does not exhibit any functional interrelationship with the way in which computing processes are performed.

Therefore, such descriptive material is considered non-statutory subject matter because it does not constitute a statutory manufacture, process, machine or composition of matter.

4. Applicant's arguments regarding claims 54, 62, 82, 87, 104, 111, 114, 121, 131, 141 have been fully considered but they are not persuasive.

Regarding claim 54, applicant argues that Lorie does not disclose or suggest "identifying whether said one storage block was part of said file system at a second time earlier than a current consistent version of said file system". In response, the claimed feature merely reads on the fact that more than one bit is used to indicate status of the snapshot. Note that the claimed "second time earlier than a current consistent version" is broad enough to read on the time a segment is modified in the method of Lorie. Although Lorie does not specifically show more than one bit is used for representing the status of the segment, it would have been obvious to one of ordinary skill in the art to use any number of bits to identify a segment depending on users' requirements.

Regarding claim 62, applicant argues that Lorie does not disclose or suggest "said snapshot being disposed as an object in said file system". In response, the claimed "as an object in said file system" merely reads on the fact that any snapshot is created from a collection of selected storage blocks, thus each snapshot in the file system of Lorie is clearly disposed as an object in the file system.

Regarding claim 82, applicant argues that Lorie appears to teach against having both a first and second snapshot present. In response, Lorie clearly teaches the

concept of having both first and second snapshot when Lorie shows two copies of the master (see page 97).

Regarding claim 87, applicant argues that Lorie does not disclose or suggest sending said image stream from a source file system to a destination file system. In response, although Lorie does not specifically show sending said image stream from a source file system to a destination file system, Lorie teaches maintaining two copies for preventing destruction (see page 101, section 4). Therefore, it would have been obvious to one of ordinary skill in the art to send said image stream from a source file system to a destination file system in order to prevent destruction of the snapshot of a file system.

Regarding claim 104, applicant argues that Lorie does not disclose or suggest a plurality of snapshots. In response, claim 104 is broad enough to read on the fact that Lorie maintains two copies of the data on different volumes (see page 101, section 4).

Regarding claims 111, 114, applicant argues that Lorie does not disclose or suggest said first snapshot being represented as an object in said file system. In response, the claimed "as an object in said file system" merely reads on the fact that any snapshot is created from a collection of selected storage blocks, thus each snapshot in the file system of Lorie is clearly represented as an object in the file system.

Regarding claim 121, applicant argues that Lorie does not disclose or suggest "said shadow snapshot being disposed as a single object in said file system". In response, the claimed "as a single object in said file system" merely reads on the fact that any shadow snapshot is created from a collection of selected storage blocks, thus

each shadow snapshot in the file system of Lorie is clearly disposed as a single object in the file system.

Regarding claim 131, applicant argues that Lorie does not disclose or suggest "said mark on allocate storage image is disposed as a single object in said file system". In response, the claimed "as a single object in said file system" merely reads on the fact that any mark on allocate storage image is created from a collection of selected storage blocks, thus each mark on allocate storage image is clearly disposed as a single object in the file system.

Regarding claim 141, applicant argues that Lorie does not disclose or suggest "said mark on deallocate storage image is disposed as a single object in said file system". In response, the claimed "as a single object in said file system" merely reads on the fact that any mark on deallocate storage image is created from a collection of selected storage blocks, thus each mark on deallocate storage image is clearly disposed as a single object in the file system.

For all the reasons stated above, rejection to claims 54, 56-98, 104, 105, 111-114, 121-124, 126-131, 133-147 is maintained using Lorie of record.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 54, 56-81, 104, 105, 121-124, 126-131, 133-147 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Applicant amended claims 54, 104, 121, 131, 141 by further describing a file system. Clearly any file system stores and retrieves information. However, those claims do not require any information retrieval or storage operation using a file system. The body of the claims consists of mere non-functional descriptive material without any practical application. Claim 54 for example recites data stored in blocks associated with a plurality of bits, at least one bit identifying an earlier version of the file system, at least a second bit also identifying an earlier version of the file system. Although the claim implicitly recites data embodied on a computer-readable medium since bits are digital, the data does not impart functionality to either the data as claimed or to the computer. As such, the claimed invention recites non-functional descriptive material, i.e., mere data. Non-functional descriptive data stored on a computer-readable medium is merely carried on the medium, it is not structurally and functionally interrelated to the medium. Therefore, the claimed subject matter is non-statutory.

Applicant amendment to claim 62 renders claims 62-81 non-statutory. Claims 62-81 consist of mere non-functional descriptive material. The claims recite mere arrangement of non-functional data that does not exhibit any functional interrelationship with the way in which computing processes are performed. Therefore, such descriptive material is considered non-statutory subject matter because it does not constitute a statutory manufacture, process, machine or composition of matter.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 54, 56-98, 104, 105, 111-114, 121-124, 126-131, 133-147 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raymond A. Lorie "Physical Integrity in a Large Segmented Database", ACM Transactions on Database Systems, Vol.2, No. 1., March 1977, pages 91-104, of record.

Claim 54 merely reads on the file system of Lorie consisting of a plurality of segments (see the abstract). Segments clearly consist of bits since the file system is digital. The claimed "at least one of said plurality of bits...consistent version of said file system" is met when Lorie shows the Mod bits (see page 95) indicating whether the block has been modified or not. The claimed "at least a second one of said plurality of bits...said file system" merely reads on the fact that more than one bit is used to indicate status. Note that the claimed "second time earlier than a current consistent version" is broad enough to read on the time a segment is modified in the method of Lorie. Note also there is no first time required in claim 54. Although Lorie does not specifically show more than one bit is used for representing the status of the segment, it would have been obvious to one of ordinary skill in the art to use any number of bits to identify a segment depending on users' requirements.

Regarding claim 56, Lorie discloses an element disposed for selecting storage blocks in response to said one bit and said second bit associated with said selected storage block when Lorie shows that the method selects a free slot (see page 97).

Regarding claim 57, Lorie discloses an element disposed for copying said selected storage blocks to a destination when Lorie shows that a modified segment is copied to a new slot (see page 97).

Regarding claims 58, 61, although Lorie does not specifically show "wherein said destination includes...plurality of file systems", it would have been obvious to one of ordinary skill in the art to include any destination depending on users' requirements.

Regarding claim 59, Lorie discloses an element disposed for selecting storage blocks in response to said one bit and said second bit associated with said selected storage block when Lorie shows that the method selects a free slot (see page 97).

Regarding claim 60, Lorie discloses an element disposed for copying said selected storage blocks to a destination when Lorie shows that a modified segment is copied to a new slot (see page 97).

Regarding claim 62, Lorie discloses all the claimed subject matter including "a file system...in said file system" (see the abstract, pages 93, 96, 97).

Claims 63, 65 merely read on the fact that snapshots are formed of member storage blocks which have been added to or removed from the original consistent storage blocks. Lorie teaches such features when Lorie shows periodic backup copies of the database (see page 93).

Regarding claim 66, the claimed shadow snapshot is merely a subset of a snapshot, the member storage blocks no longer forming a consistent file system as defined by applicant in the specification. This feature merely reads on the fact that storage blocks are reusable in the system of Lorie. Clearly, a storage image is defined

based on the snapshot and shadow snapshot and indicate a set of member storage blocks selected from a plurality of storage blocks as claimed.

Claims 67, 73 merely read on the fact that the Mod bits keep track of blocks to be copied because they had been modified (see page 95).

Claim 68 merely reads on the fact that the system of Lorie includes multiple snapshots (see page 97).

Regarding claim 69, since the snapshot in the system of Lorie exists as a distinct entity, clearly the system can manipulate the snapshot without having to traverse a hierarchy of file system objects within said snapshot.

Regarding claim 70, since snapshots are formed by adding or removing blocks of data, clearly, the data structure is in a format allowing a set management operation as claimed.

Regarding claim 71, Lorie shows that a snapshot includes an array of bits (see page 96). Clearly, said array has one bit for each storage block since storage blocks are made up of bits.

Regarding claim 72, Lorie discloses a plurality of snapshots (see page 101). Clearly, a storage image is determined in response to said plurality of snapshots and said storage image is defining a second set of member storage blocks selected from said plurality of storage blocks.

Claims 64, 74, 75 merely read on the fact that operations of logical sum and difference are performed on storage blocks to form storage image for snapshots. Since the snapshots in the system of Lorie exist as distinct entities, it would have been

obvious to one of ordinary skill in the art to form a storage image by performing a logical sum or difference on member storage blocks as claimed.

Regarding claim 76, since the storage image is formed by adding or removing member storage blocks for said snapshot, clearly said storage image is a result of a set management operation as claimed.

Regarding claim 77, Lorie discloses the claimed "wherein said snapshot...without reading any contents of said storage blocks in said plurality" when Lorie shows the use of shadow bits to release slots in the current bit map (see page 99).

Regarding claim 79, Lorie discloses that each snapshot includes a data structure identifying which storage blocks in said plurality of storage blocks are member storage blocks of said snapshot (see page 99).

Regarding claim 80, since only one bit is required to indicate whether the block is part of a corresponding snapshot, clearly the data structure uses no more than 1/100 of storage amount required by said storage block.

Regarding claim 81, although Lorie does not specifically disclose that the data structure uses no more than four bytes per storage block, it would have been obvious to one of ordinary skill in the art to do so in order to save memory.

Regarding claim 82, the claimed first and second snapshots are met when Lorie shows saving new states (see page 99). The claimed step of performing an operation on said snapshots merely reads on the fact that snapshots are combinable to form a storage image. Therefore, it would have been obvious to one of ordinary skill in the art to combine snapshots in order to get an image of a plurality of snapshots.

Claims 84, 85 merely read on the fact that operations of logical sum and difference are performed on snapshots. Since the snapshots in the system of Lorie exist as distinct entities, it would have been obvious to one of ordinary skill in the art to make copies by including or excluding a selected range of snapshots and by copying to a destination in order to use existing snapshots to readily create new ones and save processing time.

Regarding claim 86, official notice is taken that it is well known in the art to copy an image to a tape, a disk, a data structure in a second file system, a set of network messages or a destination distributed over a plurality of file system. Therefore, it would have been obvious to one of ordinary skill in the art to include the above means as destination in order to copy an image depending on availability of the equipment.

Regarding claim 87, the claimed step of defining a storage image of a set of member storage blocks forming a consistent file system other than an active file system merely reads on the fact that snapshots are formed in the method of Lorie (see page 95). Clearly, snapshots form an image stream of a sequence of member storage blocks as claimed. Although Lorie does not specifically show sending said image stream from a source file system to a destination file system, Lorie teaches maintaining two copies for preventing destruction (see page 101, section 4). Therefore, it would have been obvious to one of ordinary skill in the art to send said image stream from a source file system to a destination file system in order to prevent destruction of the snapshot of a file system.

Claim 88 merely reads on the fact that each block is associated with a snapshot.

Regarding claim 89, Lorie discloses that the image stream is used to reconstruct the file system when Lorie shows restoring a segment (see page 99).

Claim 90 merely reads on the fact that operations are performed on storage blocks to form snapshots (see pages 94, 95).

Regarding claims 91, 92, although Lorie does not specifically show the step of optimizing said sequence of member storage blocks for a file system operation in a RAID file system, it is well known in the art to use RAID for backing up files. Since the operation of backing up files consumes time and resources, it would have been obvious to one of ordinary skill in the art to optimize said sequence in order to save processing time backing it up to RAID.

Claim 93 merely reads on the fact that the sequence of member storage blocks is optimized depending on storage medium. Since reading in parallel would speed up the operation, it would have been obvious to one of ordinary skill in the art to include optimizing said sequence in response to a physical location in a storage medium and ordering said sequence so that said member storage blocks are read in parallel in order to speed up the operation and save processing time.

Regarding claims 94, 95, Lorie discloses that the storage image represents a complete file system and changes to a file system when Lorie shows the new consistent state and the previously saved state (see page 96).

Regarding claim 96, the claimed periodic intervals merely read on the fact that snapshots are taken whenever the system advances from one consistent point to another (see page 95).

Regarding claim 97, although Lorie does not specify selecting in response to an operator command, it would have been obvious to one of ordinary skill in the art to include this feature in order to allow an operator to arbitrarily control the selecting step.

Regarding claim 98, although Lorie does not specify repeating the selection in response to a remote device, it would have been obvious to one of ordinary skill in the art to include this feature in order to allow control of the system remotely.

Regarding claim 104, Lorie discloses a file system including a plurality of snapshots, each representing an associated consistent state at an associated selected time (see page 95). Clearly, an indication is being recorded in at least one storage block in order to show which set of storage blocks form a specific snapshot.

Regarding claim 105, although Lorie does not specifically show a storage image as claimed, since snapshots exist as distinct entities, it would have been obvious to one of ordinary skill in the art to perform an operation on at least two of said snapshots in order to benefit from existing snapshot formats.

Claim 111 merely reads on the fact that a first snapshot consisting of storage blocks forming a consistent file system other than an active file system is formed in the system of Lorie and that copying its storage blocks does not alter the snapshot in any way (see page 99).

Regarding claim 112, Lorie discloses a second snapshot when Lorie shows saving a new state (see page 99). Clearly, said second snapshot has a set of member storage blocks forming a consistent file system other than an active file system and is

represented as an object in said file system. Claim 112, last paragraph merely reads on the fact that copying said member storage blocks do not alter the snapshot in any way.

Regarding claim 113, although Lorie does not specifically show an image stream including a set of storage blocks of both first and second snapshots, since snapshots exist as distinct entities, it would have been obvious to one of ordinary skill in the art to include both first and second snapshots as claimed in order to benefit from existing snapshot formats. Furthermore, copying said member storage blocks clearly does not alter the snapshots in any way.

Claim 114 merely reads on the fact that a snapshot consisting of storage blocks forming a consistent file system other than an active file system is formed in the system of Lorie (see page 99). Clearly, backup and restore operations do not alter the snapshot in any way.

Regarding claim 121, the claimed shadow snapshot is merely a subset of a snapshot, the member storage blocks no longer forming a consistent file system as defined by applicant in the specification. This feature merely reads on the fact that storage blocks are reusable in the system of Lorie (see page 99). Furthermore, since the snapshot in the system of Lorie exists as a distinct entity, clearly the system can manipulate the shadow snapshot without having to traverse a hierarchy of file system objects within said snapshot.

Regarding claim 122, although Lorie does not specifically show a format for shadow snapshots, it would have been obvious to one of ordinary skill in the art to use a format that facilitates set management operation in order to process them efficiently.

Regarding claim 123, since only one bit is required to indicate whether the block is part of a corresponding snapshot, clearly the data structure uses no more than 1/100 of storage amount required by said storage block.

Regarding claim 124, although Lorie does not specify a size for a shadow snapshot, it would have been obvious to one of ordinary skill in the art to use about one byte per storage block in order to save memory.

Claims 126, 127, 128 merely read on the fact that member storage blocks are removed from a snapshot in response to an operation on the file system. Lorie clearly shows such a feature when Lorie discloses that blocks are reusable (see page 99).

Regarding claim 129, Lorie discloses the claimed "wherein said snapshot...without reading any contents of said storage blocks in said plurality" when Lorie shows the use of shadow bits to release slots in the current bit map (see page 99).

Claims 131, 141 merely recite components of a snapshot. Clearly, a snapshot consists of mark-on-allocate image or mark-on-deallocate image as claimed because snapshots are consistent points of a file system. Evidently, member storage blocks have been added or removed depending on the consistency of the file system at the time the snapshot was taken. Furthermore, since the snapshot in the system of Lorie exists as a distinct entity, clearly the system can manipulate the snapshot without having to traverse a hierarchy of file system objects within said snapshot.

Regarding claims 133, 143, since snapshots are formed by adding or removing blocks of data, clearly, the mark-on-allocate image and mark-on-deallocate image are in a format allowing an efficient set management operation as claimed.

Regarding claims 134, 144, since only one bit is required to indicate whether the block is part of a corresponding snapshot, clearly the mark-on-allocate image and mark-on-deallocated image use no more than 1/100 of storage amount required by said storage block.

Regarding claims 135, 145, although Lorie does not specifically show that the data structure uses no more than four bytes per storage block, it would have been obvious to one of ordinary skill in the art to make said mark-on-allocate and said mark-on-deallocate images use no more than four bytes per storage block in order to save memory.

Claims 136-139 are rejected for the same reasons discussed in claims 126-129 above.

Claim 142 merely reads on the fact that snapshots are removed from the file system. Clearly the mark-on-deallocate image in the system of Lorie is disposed as a single object and the system can manipulate the shadow snapshot without having to traverse a hierarchy of file system objects within said snapshot.

Regarding claim 146, Lorie discloses the claimed "wherein said snapshot...without reading any contents of said storage blocks in said plurality" when Lorie shows the use of shadow bits to release slots in the current bit map (see page 99).

Claims 78, 83, 130, 140, 147 merely read on the well-known fact that set management operation clearly includes logical sum or difference.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Uyen T. Le whose telephone number is 571-272-4021. The examiner can normally be reached on M-F 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Safet Metjahic can be reached on 571-272-4023. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2163

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

30 May 2005



UYEN LE
PRIMARY EXAMINER